March 2001

Umpqua River
And
Winchester Bay
Sediment Quality Evaluation

Abstract

This evaluation was conducted following procedures set forth in the Inland Testing Manual (ITM) and the Ocean Disposal Testing Manual (Green Book), developed jointly by the Corps and EPA to assess dredged material. Guidelines used are those developed to implement the Clean Water Act (CWA) and the Marine Protection, Research and Sanctuary Act (MPRSA). These guidelines and associated screening levels (SL) are those adopted for use in the Dredge Material Evaluation Framework (DMEF) for the Lower Columbia River Management Area, November 1998.

Eight (8) sediment samples were collected from the Umpqua River and six (6) samples from Winchester Bay on February 28, 2001 (see Figures 1 and 2). All samples were submitted for physical analyses, with 6 samples analyzed for metals (9 inorganic), total organic carbon (TOC), pesticides/polychlorinated biphenyls (PCBs), phenols, phthalates, miscellaneous extractables, polynuclear aromatic hydrocarbons (PAHs) and organotin (TBT) analysis.

Sediment represented by samples collected during this sampling event exceeded the Tier II guidelines screening level (SL) in one sample (WB-BC-03) for benzoic acid (1.2 times the DMEF screening level). Because benzoic acid is found in many natural forms (see Current Sampling Event for more detailed information) and because neither Winchester Bay nor the sample in question have any known source of benzoic acid in the vicinity, the benzoic acid detected is thought to be an isolated, most likely a natural source, of benzoic acid. In light of this determination all sediment (including sample WB-BC-03) is determined to be suitable for open, unconfined, inwater placement without further characterization.

Introduction

This report will characterize the sediment to be dredged at Umpqua River and Winchester Bay for the purposes of dredging and disposal. The sampling and analysis objectives are stated in the Sampling and Analysis Plan (SAP) and are also, listed below. This report will outline the procedures used to accomplish these goals.

SAMPLING AND ANALYSIS OBJECTIVES

- Characterize sediments in accordance with the regional dredge material-testing manual, the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF) for evaluation of environmental impact of both the dredging and disposal events.

- Collect, handle and analyze representative sediment, of the purposed dredging prism, in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements.

- Conduct physical and chemical characterization only, for this sediment evaluation, unless DMEF screening levels are exceeded and further characterization (Tier III Biological Assays) is needed to determine disposal method.

Previous Studies

Previous sediment evaluation studies of the federal project at the Umpqua River and Winchester Bay were conducted in 1980, 1986, 1990, 1992 and 1996. Sediment evaluations were conducted in South Beach Marina in 1991 and 1995. The Federal Channel sediment is sandy material with the exception of the shoal in the northeast side of the turning basin, which is predominantly silt. Samples collected in the turn between river mile (RM) 1 and 2 contained gravel and shell hash. In a joint USACE/EPA 1991 sediment study TBT, phenol and 4-methylphenol were detected at levels greater than the established levels of concern in the South Beach Marina. The May 1991 study re-sampled the area of concern and subjected the samples to additional physical, chemical and bioassay analyses. Based upon the biological testing these and all other sediments of previous studies have been found suitable for open water, unconfined placement.

Current Sampling Event/Discussion

Eight (8) sediment samples were collected from the Umpqua River and six (6) samples from Winchester Bay on February 28, 2001(see Figures 1 and 2). An additional sample was attempted from the shoal at the river entrance, but wave conditions prevented collecting it. All samples were submitted for physical analyses, with 6 samples analyzed for metals (9 inorganic), total organic carbon (TOC), pesticides/polychlorinated biphenyls (PCBs), phenols, phthalates, miscellaneous extractables, polynuclear aromatic hydrocarbons (PAHs) and organotin (TBT) analysis. Five (5) of the six (6) samples submitted for chemical analyses were from Winchester Bay and the sixth (6) sample was from Gardiner Bay, near where petroleum was discovered in a previous dredging event.

Butylbenzyl phthalate, in sample WB-BC-01 was at the SL of 970 ug/kg. Phthalates are usually associated with plastics and other manufactured products, such as, latex gloves and the shiny side of aluminum foil (common ways phthalates are introduced into samples in the field or laboratory). Phthalates are a very common contaminates at low levels.

Benzoic acid was detected in one (1) sample (WB-BC-03) at 780 ug/kg, which is 1.2 times the SL. Benzoic acid occurs in nature in free and combined forms. Gum benzoin may contain as much as 20% benzoic acid. Most berries contain appreciable amounts (around 0.05%). Almost all vertebrates, except fowl excrete benzoic acid mainly as hippuric acid. It is also manufactured and used in dyes, among other uses.

Results

Physical and Volatile Solids, (ASTM methods): Data for these analyses are presented in Table 1. Five (5) of the fourteen (14) samples submitted for analysis exceeded 20% fines and/or 5% volatile

solids. Nine (9) samples submitted were classified as "poorly graded sand", three (3) as "sandy silt" and two (2) as "silt with sand". Median grain size for all samples is 0.18 mm, with 77.59% sand and 22.28% fines. All samples were brown in color. Volatile solids ranged from 1.08% to 13.88%. The mean grain-size for samples collected from Winchester Bay (excluding WB-BC-04, which was 99.34% sand) were 41.45% sand, 58.55% fines with 10.8% volatile solids. The other nine (9) samples from the main channel and turning basin were 97.69% sand with 1.3% volatile solids.

Metals (method 6020/7471), Total Organic Carbon (TOC) (method 9060): Data for these analyses are presented in Table 2. Low levels of most metals analyzed for were found in all of the samples collected, but levels do not approach the SL. The highest level detected was for mercury, which is 63.4% of the SL. TOC ranged from 6,000 to 61,000 mg/kg.

Organotin (TBT) (pore water method): Data for these analyses are presented in Table 3. Organotin was not detected at the method detection limit (<0.0052 ug/L).

Pesticide/PCBs (method 8081A), Phenols, Phthalates and Misc. Extractables (method 8270): Data for these analyses are presented in Table 4. No PCBs or pesticides (including DDT) were found at the method detection limits (MDL). The compound phenol were detected in one sample at a level 54.8% of the SL. Total DDT and its breakdown products, DDD and DDE were not detected above the MDL. Three (3) phthalates were detected, with Butylbenzylphthalate, in sample WB-BC-01 at the SL of 970 ug/kg. Benzoic acid was detected in one (1) sample at 780 ug/kg, which is 1.2 times the SL. Benzoic acid occurs in nature in free and combined forms. Gum benzoin may contain as much as 20%. Most berries contain appreciable amounts (around 0.05%). Excreted mainly as hippuric acid by almost all vertebrates, except fowl. It is also manufactured

Polynuclear Aromatic Hydrocarbons (PAHs) (method 8270): Data for these analyses are presented in Tables 4 & 5. Low levels of some individual "low molecular weight" PAHs were found in some samples at levels <2% of the SL. Low levels of most "high molecular weight" PAHs were found in some samples at low levels. The highest was Fluoranthene at 17.1% of the SL.

Conclusion

Collection and evaluation of the sediment data was completed using guidelines from the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF). The DMEF is a regional manual developed jointly with regional EPA, Corps, Oregon Dept. of Environmental Quality and Washington Depts. of Ecology and Natural Resources. This document is a guideline for implementing the Clean Water Act, 40 CFR 230 sec 404 (b)(1) and for the Marine Protection, Research and Sanctuary Act (MPRSA). The screening levels used are those adopted for use in the DMEF, final November 1998. The DMEF Tiered testing approach requires that material in excess of 20% fines and greater than 5% volatile solids, as well as any material with prior history or is suspected ("reason to believe") of being contaminated, be subjected to chemical as well as physical analyses.

Butylbenzyl phthalate, in sample WB-BC-01 was at the SL of 970 ug/kg. Benzoic acid was detected in one (1) sample (WB-BC-03) at 780 ug/kg, which is 1.2 times the SL. Phthalates are

usually associated with plastics and other manufactured products, such as, latex gloves and the shiny side of aluminum foil (common ways phthalates are introduced into samples in the field or laboratory). Phthalates are a very common contaminates at low levels.

Benzoic acid occurs in nature in free and combined forms. Gum benzoin may contain as much as 20% benzoic acid. Most berries contain appreciable amounts (around 0.05%). Almost all vertebrates, except fowl excrete benzoic acid mainly as hippuric acid. It is also manufactured and used in dyes.

Because benzoic acid is found in many natural forms and neither Winchester Bay nor the sample in question have any likely source of either butylbenzyl phthalate or benzoic acid in the vicinity of Winchester Bay, it is likely that an isolated source of this material was picked up in the sediment or contamination was introduced into the sample from sampling technique or laboratory contamination. In light of this determination all sediment is determined to be suitable for open, unconfined, inwater placement without further characterization.

References

1. U.S. army Corps of Engineers, Portland District, Seattle District; U.S. Environmental Protection Agency, Region 10; Oregon Department of Environmental Quality; Washington State Department of Natural Resources and Department of Ecology. 1998 Final. Dredge Material Evaluation Framework for the Lower Columbia River Management Area.

2. U. S. Environmental Protection Agency and U. S. Army Corps of Engineers. February 1998. Evaluation of Dredged Material Proposed for Discharge in Inland and Near Coastal Waters – Testing Manual, dated (referred to as the "Inland Testing Manual").

3. The Clean Water Act, 40 CFR 230 (b) (1).

4. Turner, R. 1980. Factual Determination: Umpqua River Federal Navigation Project, October 1980. U.S. Army Corps of Engineers, Portland District.

5. Siipola, M. February 1989. Umpqua River (Gardiner Channel) Sediment Quality Evaluation, 1989. U.S. Army Corps of Engineers, Portland District.

6. Britton J. 1992. Update on Suitability of Winchester Bay Sediment for Development of Wetlands habitat in Constructed Dunal Ponds on the North Spit of the Umpqua River. U.S. Army Corps of Engineers, Portland District.

7. Sturgill, J. July 1996. Sediment Quality Evaluation for Umpqua River Federal Navigation Channel1996. U.S. Army Corps of Engineers, Portland District.

Physical Analysis & Volatile Solids

	Grain Size (mm)				%					
Sample I.D.	**Median**		**Mean**		**Gravel**	**Sand**	**Silt/Clay**		**Volatile solids**	
WB-BC-01	0.030		0.0643		0.00	25.01	74.99		13.88	
WB-BC-02	0.044		0.0643		0.00	40.56	59.44		11.58	
WB-BC-03	0.095		0.1004		0.00	73.64	26.36		10.38	
WB-BC-04	0.320		0.2663		0.00	99.34	0.66		1.48	
WB-BC-05	0.059		0.0664		0.00	46.52	53.48		8.04	
WB-BC-06	0.024		0.0516		0.00	21.50	78.5		10.09	
UR-BC-01	0.140		0.1096		0.00	90.75	9.25		3.23	
UR-BC-02	0.300		0.2670		0.39	98.34	1.27		1.46	
UR-BC-03	0.330		0.2881		0.24	98.48	1.28		1.86	
UR-BC-04	0.180		0.1406		0.00	96.63	3.37		2.67	
UR-BC-05	0.040		0.2694		0.00	98.18	1.82		3.73	
UR-BC-06	0.053		0.1687		0.00	99.06	0.94		1.89	
UR-BC-07	0.390		0.3658		0.76	99.17	0.07		1.68	
UR-BC-08	0.300		0.2735		0.89	98.25	0.86		3.06	
UR-BC-08 DUP	0.300		0.2288		0.00	100.0	0.00		1.08	
Mean	0.165		0.1767		0.13	77.59	22.28		5.29	
Minimum	0.024		0.0516		0.00	21.50	0.00		1.08	
Maximum	0.390		0.3658		0.89	100.0	78.5		13.88	

Winchester Bay (WB) samples (excluding WB-BC-04, which was 99.34% sand) had a mean of 41.45% sand and 58.55% fines.

Inorganic Metals and TOC

Sample I.D.	As	Sb	Cd	Cu	Pb	Hg	Ni	Ag	Zn	TOC
	mg/kg (ppm)									
WB-BC-01	5.6	0.27 J,B1	0.7 J	31 B2	7.3	0.24	47	0.2 J	69	53000
WB-BC-02	8.4	1.0 J,B1	0.87	45 B2	11	0.26	63	0.21 J	86	39000
WB-BC-03	3.4	0.47 J,B1	0.45 J	14	3.4	0.18	26	0.078 J	41	61000
WB-BC-05	5.1	0.44 J,B1	0.65 J	27	6.1	0.15	48	0.12 J	69	23000
WB-BC-06	4.7	<0.1	0.53 J	27	6.7	0.22	46	0.096 J	71	29000
UR-BC-01	6.1	0.23 J,B1	0.4 J	18 B2	5.2	0.074	35	0.084 J	64	6000
Screening level (SL)	57	150	5.1	390	450	0.41	140	6.1	410	

J = Estimated value (reported values are above the MDL, but below the PQL).
B1 = Low level contamination was present in the method blank (reported level was < 10 times blank concentration).
B2 = Low level contamination was present in the method blank (reported level was > 10 times blank concentration).

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit)

Organotin

Interstitial (Pore) Water

Sample ID		Tetrabutyltin	Tributyltin	Dibutyltin	Monobutyltin		Total TBT
			ug/L (ppb)				
WB-BC-01		<0.0024	<0.0035	<0.0024	<0.0023		ND
WB-BC-02		<0.0027	<0.0039	<0.0027	<0.0026		ND
WB-BC-03		<0.0036	<0.0052	<0.0036	<0.0035		ND
WB-BC-05		<0.0037	<0.0052	<0.0037	<0.0035		ND
WB-BC-06		<0.0031	<0.0044	<0.0031	<0.0030		ND
UR-BC-01		<0.012	<0.017	<0.012	<0.012		ND
Screening level (SL)		+	+	+	+	=	0.15

TBT = Total organotin (interstitial water).

Symbol (<) = Non-detect at the value listed (Method Detection Limit).

Pesticides/PCBs, Phenols, Phthalates, Herbicides and Extractables

Sample I.D.	Pesticides					Phenols		Phthalates			Extractables
	ug/kg (ppb)										
	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT		Phenol	3-&4-Methyl phenol	Di-n-octyl phthalate	bis(2-Ethyl) hexzyl phthalate	Butyl Benzyl phthalate	Benzoic Acid
WB-BC-01	<0.28	<0.33	<0.41	ND		<73	56 J	96 J	210	970	120
WB-BC-02	<0.22	<0.26	<0.32	ND		<56	<41	<37	<47	<23	<17
WB-BC-03	<0.17	<0.21	<0.25	ND		230	68 J	<30	53 J	<18	**780**
WB-BC-05	<0.18	<0.22	<0.27	ND		<46	<33	<30	<38	<19	270
WB-BC-06	<0.21	<0.25	<0.31	ND		<55	<40	<36	<45	<22	<17
UR-BC-01	<0.16	<0.19	<0.23	ND		<41	<30	<27	<34	<17	<13
Screen level (SL)	DDD + DDE + DDT =			6.9		420	670	6200	8300	970	650

* SL not established

PCBs = Non-detect (ND) <18.0 ppb (SL = 130 ppb).

YB-BC-A is a blind duplicate of YB-BC-09

[1] = Estimated value (reported values are above the MDL, but below the PQL).

[2] = Low level contamination was present in the method blank (reported level was < 10 times blank concentration).

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit)

Polynuclear Aromatic Hydrocarbons (PAHs)

Low Molecular Weight Analytes

ug/kg (ppb)

Sample I.D.	Acenapththene	Acenaphthylene	Anthracene	Fluorene	2-Methyl napthalene	Naphthalene	Phenanthrene	Total Low PAHs
WB-BC-01	<14	<16	<19	<16	<29	<40	<13	ND
WB-BC-02	<11	<13	<15	<13	<22	<30	25 J	25 J
WB-BC-03	<8.8	<10	<12	<10	20 J	<25	25	45 J
WB-BC-05	<9	<10	<12	<10	<18	<25	20 J	20 J
WB-BC-06	<11	<12	<15	<12	<22	<30	<9.9	ND
UR-BC-01	<8	<9.2	<11	<9.2	<16	<22	<7.4	ND
Screen level (SL)	500	560	960	540	670	2100	1500	5200

YB-BC-A is a blind duplicate of YB-BC-09

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit)

Polynuclear Aromatic Hydrocarbons (PAHs)

High Molecular Weight Analytes

ug/kg (ppb)

Sample I.D.	Benzo(a) anth racene	Benzo(b) fluro anthene	Benzo(k) fluro anthene	Benzo(g,h,i) perylene	Chrysene	Pyrene	Benzo(a) pyrene	Dibenz(a,h) anthracene	Indeno (1,2,3-cd) pyrene	Fluoran thene	Total High PAHs
WB-BC-01	<13	<13		<6	<17	36 J	<17	<9.3	<15	68	104
WB-BC-02	<9.8	<13		<4.6	31	28 J	<13	<7.2	<12	55	114
WB-BC-03	<8	<8.3		<3.8	<10	<7.1	<10	<5.8	<9.4	30	30
WB-BC-05	<8.1	<8.5		<3.8	<11	30	<11	<5.9	<9.5	68	98
WB-BC-06	<9.6	<10		<4.5	<13	30	<12	<7	<11	36	66
UR-BC-01	<7.2	<7.5		<3.4	<9.4	<6.4	<9.4	<5.3	<8.5	<7.2	ND
Screen level (SL)	1300	3200		670	1400	2600	1600	230	600	1700	12000

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).

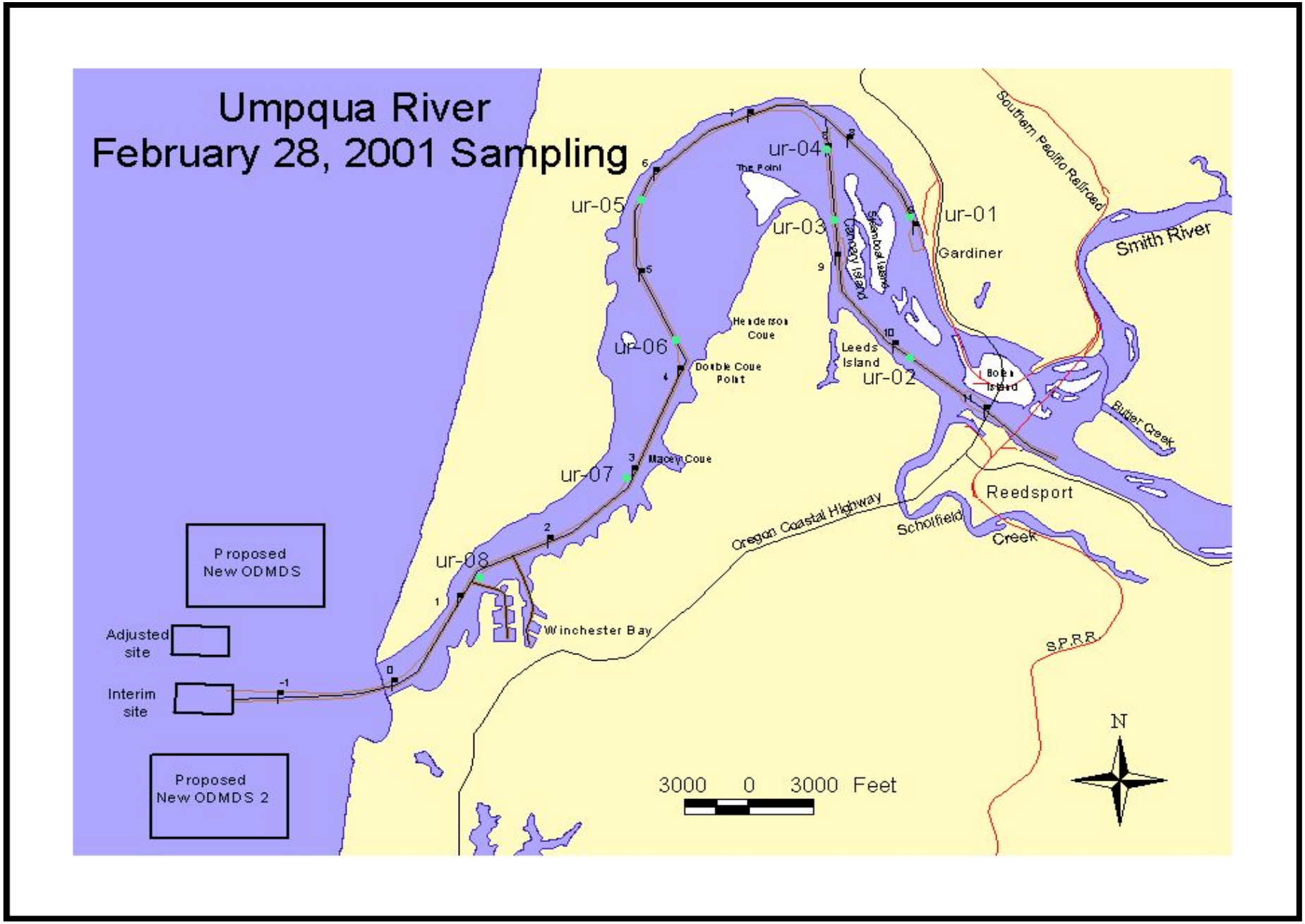
Umpqua River
February 28, 2001 Sampling
ur-01
ur-02
ur-03
ur-04
ur-05
ur-06
ur-07
ur-08
Gardiner
Reedsport
Winchester Bay
Smith River
Southern Pacific Railroad
Oregon Coastal Highway
Scholfield Creek
Butler Creek
S.P.R.R.
Leeds Island
Double Coue Point
Henderson Coue
Macey Coue
The Point
Proposed New ODMDS
Adjusted site
Interim site
Proposed New ODMDS 2
3000 0 3000 Feet
N

Figure 2, Winchester Bay **Sampled February 28, 2001**